

²⁰⁸Pb(p,n),(p,np')

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. J. Martin	NDS 108,1583 (2007)	1-Jun-2007

Nuclear level densities extracted (1995Wa03).

1989F101 extract Gamow-Teller strength normalized to the Fermi transition strength localized in the isobaric analog state. The strength up to and including the giant resonance is 56% of the 3(N-Z) sum rule, with 46% observed in the giant resonance and 10% observed in lower-energy structures. An upper limit on the 1⁺ strength in the region above the giant resonance up to 38 MeV is estimated to be 37%. An upper limit on the total strength in the discrete peaks and the continuum is 93% 23 of 3(N-Z).

- (p,n) [1974Fi14](#) E=25.8 MeV
[1972Cr07](#) E=25 MeV
[1980Ho21](#) E=120 MeV FWHM ≈670 keV, 160 MeV FWHM ≈1200 keV
[1980St26](#) E=45 MeV
[1981Ho03](#) E=120,160,200 MeV
[1981Ga26](#) E=200 MeV, FWHM ≈ 1 MeV
[1984An08](#) E=134, FWHM=330-800 keV
[1985Ni06](#) E=41 MeV FWHM ≈330 keV
[1989F101](#) E=134.4 MeV, FWHM=430 keV
[1991An04](#) Analysis Of Data Of [1989F101](#)
[1995Wa03](#) E=6.95, 11.2 MeV
 Others: [1972Wo23](#), [1971Wo04](#)
- (p,np') [1973Wo04](#) E=30.5 MeV
[1972Cr04](#) E=21.3-35 MeV
[1977Bh02](#) E=25 MeV, N-P' Coin
 Others: [1979LiZU](#), [1971Wo04](#), [1966An04](#), [1969Ig01](#)

²⁰⁸Bi Levels

E(level) ^{†b}	J ^{π†}	L [‡]	Γ (MeV) ^{&}	Comments
8.4×10 ² 10				L: L ≠ 0.
1.78×10 ³ 10	1 ⁺	0		
2.72×10 ³ 10	(2) ⁻	1	≈0.67	E(level): other: 2800 200 (1980Ho21), 2700 (1981Ga26). J ^π : ΔS=1. Possibly the π1h _{9/2} ν1i _{13/2} ⁻¹ 2 ⁻ state tentatively assigned in (p,d) to the 2894 adopted level. The configuration is confirmed by 1981Os09 from an RPA calculation.
3.13×10 ³ 10 3400	(13) ⁺	0+1		E(level): from 1984An08 . J ^π : L≈12 from σ(θ) (1984An08) based on agreement with σ(θ) calculated for an assumed 0ħ w π1i _{13/2} ν1i _{13/2} ⁻¹ stretched configuration. The authors point out that the observed peak may include an unresolved 11 ⁺ state with L=10.
3.92×10 ³ 10		0+1		
4.61×10 ³ 10		0+1		
5.70×10 ³ 10		0+1		
7.13×10 ³ 10		0+1		
8.19×10 ³ 10	1 ⁺	0		
9.16×10 ³ 10	1 ⁺	0		
10.38×10 ³ 10	1 ⁺	0		
11.77×10 ³ 10	1 ⁺	0		
15165 10	0 ⁺	0		E(level): weighted average of 15154 13 (1972Cr04), 15169 20 (1972Cr07), and 15188 20 (1974Fi14) from Q values with Sn(²⁰⁸ Pb)-S(p)(²⁰⁸ Bi)=3660.8 20. J ^π : see (³ He,t).

Continued on next page (footnotes at end of table)

$^{208}\text{Pb}(\text{p},\text{n}),(\text{p},\text{np}') \text{ (continued)}$ ^{208}Bi Levels (continued)

<u>E(level)^{†b}</u>	<u>J^{π†}</u>	<u>L[†]</u>	<u>Γ (MeV)^{&}</u>	<u>Comments</u>
				configuration: isobaric analog of the ^{208}Pb ground state. Γ: 202 34 (1972Cr07), 277 35 (1974Fi14 Gaussian), 235 35 (1974Fi14 Lorentzian), 280 50 (1973Wo04), 317 24 (1972Cr04). Γ=231 6 from $^{207}\text{Pb}(\text{p},\text{p}')$ and 230 17 from ($^3\text{He},\text{t}$). As pointed out by 1975Ga18 and 1977Bh02, the (p,np') reaction values are high because the analysis has not correctly taken into account a peaked background (probably due to evaporation) under the spectrum of protons deexciting the IAS. Γ(2f _{5/2})/Γ(3p _{1/2})=0.40 3, Γ(3p _{3/2})/Γ(3p _{1/2})=1.12 4. Γ(2f _{7/2})/Γ(3p _{1/2})≤0.08. These partial proton widths to levels In ^{207}Pb are weighted averages of data of 1969Ig01, 1972Cr04 and 1973Wo04. The limit on the f _{7/2} value is from 1969Ig01. 1969Ig01 also report Γ(2f _{5/2} +3p _{3/2})/Γ(3p _{1/2})=1.50 8. σ(θ) and σ(absolute) are well reproduced by a density-dependent DWIA calculation (1991An04).
15.6×10 ³ [‡] 2	1+#	0@	a	E(level): others:15400 (1985Ni06), 15600 (1981Ga26). J ^π : ΔS=1. configuration: Gamow-Teller resonance.
21.5×10 ³ [‡] 10	0 ⁻ ,1 ⁻ ,2 ⁻ #	1@	10 3	J ^π : ΔS=1. Γ: other: 10 MeV (1981Ga26). configuration: see comment on 23500 resonance.
22.9×10 ³ [‡] 2	1+#	0@	≈0.67	J ^π : ΔS=1. configuration: assigned by 1980Ho21 As T=T ₀ , and interpreted As the analog of the M1 strength In ^{208}Pb At 7.3 MeV.
23500	(1) ⁻	1	2.9	E(level),L,Γ: from 1985Ni06. Other: E=24300 (1980St26). J ^π : on the basis of random phase approximation calculations (RPA), 1981Os09 suggest that the ΔL=1 peak At 21500 reported by 1980Ho21 and 1981Ga26, with bombarding energies of 120- and 200-MeV, respectively, is a superposition of all possible ΔL= ¹ Ds1 modes with J ^π =0 ⁻ ,1 ⁻ ,2 ⁻ , and of one ΔL= ¹ Ds0 mode with J ^π =1 ⁻ . Ds=0 is expected to Be selectively excited At lower bombarding energies and Ds=1 At higher bombarding energies. Since the Ds=0 resonance is calculated to lie ≈5 MeV above the 1 ⁻ and 2 ⁻ Ds=1 resonances, the peak reported At 23500 by 1985Ni06 using E(p)=41 MeV (and At 24300 by 1980St26 using E(p)=45 MeV) is thus probably the Ds=0 component. A dominant Ds=0 component In this peak is also suggested by 1985Ni06, on the basis of HF+tda calculations; however, Ds=1 contributions May Be significant. This resonance thus corresponds In part to the T=T(0)-1 component of the analog of the electric isovector dipole resonance (GDR) In ^{208}Pb .
24.6×10 ³ [‡] 2	1+#	0@	1.2	J ^π : ΔS=1. configuration: interpreted by 1980Ho21 As the T=T(0) component of IAS of M1 strength As yet unidentified In ^{208}Pb .
28000		2	14	E(level),L,Γ: from 1981Ga26.

[†] From 1989Fi01, except where noted otherwise. Authors assign J^π=1⁺ for L=0 since the forward angle spectra are expected to result from one-step processes, and spin-flip excitations are expected to dominate. The peaks with L=0+1 probably include several Adopted Levels, so No level association is attempted.

[‡] From 1980Ho21 relative to E=15200 for the IAS.

From L-value and ΔS, with ΔS determined from σ(E) (1980Ho21).

@ From comparison of experimental σ(θ) with microscopic DWBA calculations (1980Ho21).

& From 1980Ho21 (except 1981Ga26 for the 28-MeV peak).

 $^{208}\text{Pb}(\text{p,n}),(\text{p,np}')$ (continued) ^{208}Bi Levels (continued)

^a $\Gamma(\text{MeV})=2.6$ (At $E=41$ MeV [1985Ni06](#)), 2.9 (At $E=45$ MeV, [1980St26](#)), 4.1 (At $E=120$ [1980Ho21](#)), and 4.2 (At $E=200$ MeV [1981Ga26](#)).

^b In addition to the data given in the table, [1989FI01](#) fit the excitation-energy region above the Gamow-Teller resonance up to 30 MeV by three peaks of equal Γ . These are found to be at 19920, 22560, and 25270 with $\Gamma \approx 3$ MeV and $L \neq 0$. The number of peaks used to fit this energy region is not unique, however, so a comparison with data of [1980Ho21](#), [1980St26](#), and [1985Ni06](#) is not meaningful.